

# Physics Lab Practical

*Experimental Investigation*

# Quick Links

1. [Station 1: Block on Ramp and Hints](#)
2. [Station 2: Fan Cart and Hints](#)
3. [Station 3: Bungee Einstein and Hints](#)

# Your Mission

**Find the unknown quantity at each station using:**

- Physical Measurements
- Newton's Laws
- Your physics knowledge

# Lab Notebook Requirements

1. **Initial Sketch** with measurements (add in as you measure)
2. **Free Body Diagram** with all forces
3. **Free Body Diagram** Redrawn with force components
4. **Force Components** show calculations
5. **Problem-Solving Process** solve for unknown - show all work
6. **Uncertainty Analysis** estimate uncertainty on all of your measurements

# Stations

1. Block on Ramp: Find minimal  $\mu$
2. Fan Cart: Find fan force
3. Bungee Doll: Find mass
4. **Bonus**: Sliding friction

# Tips for Success

- Start with what you *know*
- Draw clear diagrams
- Write out equations before plugging in numbers
- Check units!
- Think about uncertainties

# Station Instructions

## *Station 1: Block on Ramp*

**Setup:** Block on adjustable ramp with protractor

**Task:** Find minimum coefficient of static friction

### **Equipment:**

- Wooden block
- Adjustable ramp
- Protractor (plastic or app on your phone)
- Electronic Balance

### ***Extensions:***

1. Find maximum coefficient of static friction
2. Solve without mass measurement



## *Station 2: Fan Cart*

**Setup:** Fan cart on level track

**Task:** Determine fan force

**Equipment:**

- Fan cart & track
- Labquest & Motion Sensor
- Electronic Balance

***Extension:***

1. Find fan force for each setting
2. Use known fan force to find an unknown mass

### *Station 3: Hanging Doll*

**Setup:** Doll suspended by rubber bands

**Task:** Find doll's mass

**Equipment:**

- Spring scales



# Bonus Station: Risky Business

## *Bonus Station: Risky Business*

**Setup:** Sliding person or object on level surface

**Task:** Determine coefficient of kinetic friction

**Equipment:**

- Video Analysis
- Motion Sensor
- Stop Watch
- Metersticks or long tape measure

# Process & Expectations

1. One group at a station at a time
2. Do not use hints *unless you are stuck* → but try hints before asking me for problem-solving help.
3. If/when finished early:
  - choose between extension options at the different stations
  - OR solve **Risky Business** station
  - if you finish one go to the other



## Station 1 Hints

1. Consider forces parallel to ramp
2. Remember:  $F_f = \mu F_N$

Check work from yesterdays class (packet pages 9 & 10)

## Station 2 Hints

1.  $F_{net} = ma$
2. Measure acceleration from velocity time graph
3. What forces act horizontally?



## Station 3 Hints

1. Split angled forces into components
2. Remember to sum the vertical and horizontal forces
3. **Mass** and **Weight** ( $F_g = mg$ ) are different!